Research

What constitutes an emergency ambulance call?

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Abstract

Introduction
Ambulance services are often utilised for low-acuity conditions. This study seeks to understand under what medical circumstances the Australian public perceive it to be appropriate to call triple zero requesting ambulance assistance.

Methods
A total of 544 participants completed a 15-minute online survey distributed via social media, flyers and email links. Participants viewed 17 medical case study scenarios, developed in consultation with a panel of paramedic experts, and were asked to select which of nine possible medical interventions was most appropriate. A panel of paramedic experts reached consensus for each case study on whether it was or was not appropriate to call for triple zero assistance.

Results
Inappropriate medical intervention responses were more prevalent in scenarios deemed appropriate for ambulance assistance, compared with scenarios where an ambulance call-out was inappropriate (48% vs. 3% respectively, p<0.001). Many scenarios where ambulance use was appropriate found respondents utilising other healthcare services typically associated with lower-acuity conditions. Individuals without first aid training were more inclined to choose healthcare services incorrectly (65% vs. 69% respectively, p<0.001).

Conclusion
Responses to our case studies suggested a lack of understanding of situations that warrant an emergency. First aid training and education regarding medical emergencies and paramedic scope-of-practice would be beneficial. This study did not demonstrate substantial inappropriate ambulance usage, however respondents did not recognise the severity of certain emergencies and were inclined to utilise other healthcare services. Further research investigating the rationale behind triple zero use, improving public education and clarifying the role of paramedics is required.

Keywords:
non-urgent ambulance; inappropriate ambulance requests; emergency calls; ambulance misuse

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Introduction

Worldwide demand for ambulance services has increased faster than population growth alone can account for (1). From 1996 to 2008, demand in Australia rose 7–12.5% per annum, compared with a 1.7% population growth over the same period (1,2). Data from Ambulance Victoria suggests the rates of these increases may have steadied, but they still climbed by 3% between 2012 and 2017. Victoria's population grew by only 1.7% in 2015–2016, but requests for ambulance services grew by 5.7% across the same period (3). The Australian Institute for Primary Care found only 25% of the growth in emergency services use can be attributed to the ageing population, and that factors such as social isolation, general practitioner (GP) unavailability and increased health awareness are influencing ambulance utilisation (2). Ambulance crews detained with non-urgent requests are unavailable should life-threatening emergencies occur (1), potentially compromising patient outcomes (4). Increased ambulance use contributes to overcrowded emergency departments (EDs), which in turn places strain on ambulance providers and the finite resources of EDs (2).

While relatively little research has been done to investigate why patients with primary care health problems seek ambulance assistance (5), some suggest patients often default to the most immediate response available (6). Coupled with misconceptions regarding alternative healthcare services, as well as intentional abuse of the system (7), this sees up to 30-40% of requests for ambulance assistance being classed as 'inappropriate' (8-9).

Attempts have been made on a broad scale to better educate the general public with respect to what factors constitute an 'appropriate' compared to an 'inappropriate' call for an emergency ambulance. For example, The National Stroke Foundation of Australia ran 12 public awareness campaigns around the signs and symptoms for stroke between 2003 and 2014. Research found that calls to ambulance for stroke resulted in a significant increase in the volume of stroke-related calls (10). However, research has not yet been undertaken to determine the extent to which these calls were 'appropriate'. A review of all calls made across one week to the London Ambulance Service in 1996 suggested that the majority of calls for falls, assaults or psychiatric incidents likely did not necessitate a call to an emergency ambulance (9). This study also suggested that these calls were primarily undertaken without first contacting other services because callers believed it was necessary due to the nature of the incident.

Kirkby and Roberts conducted such a pilot survey in Birmingham (UK), concerning inappropriate 999 calls (11). The authors developed 12 case studies and asked participants to recommend what medical intervention would be most appropriate given the circumstances. Scenarios were devised from West Midlands Ambulance Service information and a single paramedic determined the appropriateness of requesting emergency ambulance assistance. Across the range of scenarios, between 47% and 100% of respondents 'correctly' identified when an ambulance was or was not required. Notably, 25% of respondents failed to recognise the need for assistance when stroke symptoms were present. Further, 53% of participants failed to identify meningitis as requiring urgent care. Those with first aid training were less likely to make 'incorrect' medical intervention decisions. This UK research further demonstrated the difficulty members of the general public have in accurately identifying when to call an ambulance.

In Australia, there is a paucity of research exploring community understanding regarding the role of ambulance services (12). Existing studies explore the perspectives of patients already utilising emergency ambulance services, without investigating the wider public's understanding of what constitutes an emergency and what factors might compel a request for assistance (1,5). Anyone in Australia can request assistance via telephone, and previous research suggests the majority of calls for ambulance assistance come from those without a medical background (13). This study (via an online survey) investigated under what medical circumstances the Australian general public would be prompted to call for ambulance assistance.

Methods

Participants
Participants were over 18 years of age and Australian residents. Printed and electronic leaflets were emailed or handed to the researchers' personal contacts and promoted on the researchers' Facebook pages, providing a brief informative overview and further directed users to an online survey link. Snowball sampling was also utilised.

Ethics approval

Ethics approval was received by the host institutions Edith Cowan University Human Research Ethics Committee (#16027).

Materials
Kirby and Roberts (11) developed 12 case studies for their research. We adapted these same 12 case studies to make them more suitable to the Australian context. We also created an additional five case studies, providing a total of 17 case studies.

Kirby and Roberts (11) had a paramedic gauge for which of their 12 case studies it was appropriate (or not) to call for ambulance assistance. We sought to replicate this method, yet instead of relying on the recommendations of a single paramedic, we utilised a panel of four paramedic educators, asking them to reach consensus on which case studies were (or were not) appropriate for emergency ambulance assistance.

A single, or panel, of health clinicians have successfully been used to classify situations as being of an emergent or non-emergent nature in several previous studies (7,14-16). The paramedic panel each reviewed the case scenarios alone and provided feedback to the research team. All case studies classified as emergencies by the panel were also suggested to be worthy of a call for emergency ambulance assistance. No further deliberation was necessary, with 100% agreement across all 17 scenarios. Nine of the 17 case studies were deemed 'appropriate' to call for emergency ambulance assistance, and eight were deemed 'inappropriate'. Table 1 provides a shortened summary of each of the 17 case study studies provided to participants.

Scenarios #3 and #5 (Table 1) indicate the possibility of a heart attack requiring urgent care. Scenario number #4 is a potential stroke victim and the paracetamol case study (scenario number #6) is an overdose with a toxic amount ingested, both necessitating ambulance assistance. Scenario #7 may result in a head injury and possibly a brain haemorrhage, while scenario #8 is a young child with symptoms suggestive of meningitis. Particularly with cardiac, stroke and meningitis, the time taken to receive definitive care at an appropriate hospital is critical to patient outcomes, hence the need for emergency ambulance

treatment (17-19).

The response option of 'call triple zero (000) for an ambulance' was ambiguously placed among eight other alternative options. Table 2 lists the responses options available to participants as they were displayed in the questionnaire.

Table 2. Options for chosen course of action in case study scenarios

Option number	Options for chosen course of action
1	Talk to a pharmacist
2	Go to the emergency department
3	Call 000 for an ambulance
4	First aid at home
5	Visit a GP or after-hours GP
6	Ask a friend or family member for advice
7	Leave and monitor the situation
8	Call Health Direct
9	Other [with a text box for alternative options to be described]

Table 1. Case study scenarios and appropriate course of action

Scenario number	Brief scenario description	Ambulance appropriate? (Yes/No)
1	Your 10-year-old brother picks up a box jellyfish at the beach, and large welts immediately appear on his arm	Yes
2	Your mother has been bitten by an unidentifiable snake	Yes
3	You are experiencing chest pain and unable to get to your GP	Yes
4	Your 77-year old grandad is slurring his words; he has not drunk any alcohol	Yes
5	Your 52-year-old husband is experiencing severe chest pain, is sweating and grey in colour	Yes
6	Your adult neighbour has taken 10x 500 mg paracetamol tablets in the past 12 hours and feels extremely unwell	Yes
7	A 3-year-old child has fallen off the couch and sustained a golf-ball size bruise to the head	Yes
8	A 4-year-old child has a high temperature, sore neck and a headache that Panadol is not relieving	Yes
9	An 80-year-old female fell out of bed, cannot get up and is complaining of hip pain	Yes
10	You are experiencing flu-like symptoms and your GP is fully booked	No
11	An 87-year-old female knocks herself against the kitchen table and sustains a large bruise to the thigh	No
12	A 4-year-old child has Lego inserted in their ear	No
13	A 25-year-old male stubs his toe playing football with his friends	No
14	Your friend is conscious, uninjured and has drunk too much alcohol on a night out. He is vomiting	No
15	Your 9-month pregnant friend goes into early stages of labour	No
16	A 40-year-old man with a 6-month history of back pain is experiencing his normal back pain. He wakes in the night due to this pain and has run out of painkillers	No
17	Your father cuts his finger chopping vegetables and the bleeding is controlled with pressure	No

Procedure

The survey link was live throughout August 2016. Participants first answered a series of demographic questions, followed by the 17 case study scenarios displayed one at a time. The order of questions was randomised to avoid ordering effects (20).

Analysis

Data was investigated via two mediums. The first combined response items #2 and #3 (ie. 'Go to ED' and 'Call ambulance') to suggest to what extent participants were able to correctly interpret events as being (or not being) an emergency. The second isolated response item #3 (ie. 'Call ambulance') to view whether participants could successfully recognise if the event did or not constitute an emergency combined with whether they chose an appropriate ambulance response.

Total scores were calculated for each individual for the amount of correct responses across the 17 case studies, providing a total score out of 17. This was undertaken for both their ability to recognise whether or not it was appropriate to call for ambulance assistance alone, as well as whether or not they correctly categorised the event as being an emergency or not (ie. 'Call ambulance' or 'Go to ED').

Results

The questionnaire was attempted by 564 respondents. Twenty respondents were screened out as they were not Australian residents. Data for a further 20 respondents was not included as they did not progress through the questionnaire to answer the case study scenarios. This left a total of 544 participants who completed the online survey. Females represented 79% of participants. The average age of participants was 41 years (range 19–81 years).

Of the 564 participants; 8% did not graduate high school, 32% graduated high school, 38% had an undergraduate university degree and 22% held a postgraduate university degree. Healthcare professionals represented 28% (n=148) of the sample. Of those not employed as healthcare professionals (n=396), 78% (n=309) had previously undertaken basic first aid training.

Table 3. Total scores by demographic factors for correctly gauging when to call 000 and correctly recognising events as an emergency

Correctly calling 000		n	mean	SD	t/F value	df	p-value
Overall sample		544	11.78	1.509	NA	NA	NA
Gender	Male	112	11.89	1.618	0.878	542	0.380
	Female	432	11.75	1.480			
Healthcare background	Yes	148	12.13	1.347	3.309	542	<0.001*
	No	396	11.65	1.547			
First aid training	Yes	309	11.81	1.512	3.803	394	<0.001*
	No	87	11.10	1.555			
Age (years)	18-30	157	11.48	1.461	3.271	3	0.021*
	31-45	186	11.97	1.412			
	46-60	136	11.85	1.673			
	60+	66	11.82	1.509			
Correctly recognising emergency		n	mean	SD	t/F value	df	p-value
Overall sample		544	13.28	1.488	NA	NA	NA
Gender	Male	112	13.15	1.520	-1.019	542	0.309
	Female	432	13.31	1.479			
Healthcare background	Yes	148	13.89	1.270	5.990	542	<0.001*
	No	396	13.05	1.501			
First aid training	Yes	309	13.16	1.478	2.657	394	0.008*
	No	87	12.68	1.529			
Age (years)	18–30	157	13.09	1.487	1.923	3	0.125
	31–45	186	13.24	1.556			
	46–60	135	13.47	1.348			
	60+	66	13.45	1.531			

* Indicates statistical significance at α<0.05

Mean total scores (out of 17) for the entire study sample for correctly gauging appropriateness to call or not call for emergency ambulance assistance, as well as correctly gauging whether or not the event constituted an emergency, are provided in Table 3. Table 3 also differentiates between mean total scores across a range of demographic factors.

Table 3 shows those with a healthcare background could better gauge when calling for emergency ambulance assistance was appropriate (p<0.001), as well as recognising an emergency (p<0.001). Removing those with a healthcare background, those that had previously undertaken first-aid training also received higher total correct scores for calling an ambulance (p<0.001) and recognising an emergency (p<0.008). A one-way ANOVA suggested there was a statistically significant difference between age categories for correctly gauging when it is appropriate to call for an ambulance (p=0.021) but not for recognising an emergency (p=0.125). Post-hoc bonferroni analyses suggested the younger age demographic (18–30 years) was less capable of correctly gauging the appropriateness of calling for an ambulance than those from the 31–45 years age demographic (p=0.013).

Inappropriate medical intervention responses were more prevalent in scenarios deemed appropriate for ambulance assistance, compared with scenarios where an ambulance call-out was inappropriate (n=544; 48% vs. 3% respectively, p<0.001). Those with first aid training, compared to those with no first aid training, were better at correctly identifying cases appropriate for ambulance response (52% vs. 46% respectively, p=0.002) and not appropriate for ambulance response (97% vs. 95% respectively, p=0.029).

Similarly, inappropriate medical intervention responses were more prevalent in scenarios appropriate for an emergency response, compared to those that were not (n=544; 27% vs. 17% respectively, p<0.001). Those with first aid training were better at correctly identifying cases that were an emergency (73% vs. 69 respectively, p=0.048), but no significant differences were found between those first aid trained and those not first aid trained for non-emergency scenarios (83% vs. 80% respectively, p=0.176).

Table 4 depicts incorrect response proportions for each of the individual case studies, also splitting proportions by whether or not the participant had previously undertaken basic first aid training.

A number of case studies deemed emergencies by our paramedic panel were not perceived as worthy of a call for emergency ambulance assistance by a substantial proportion of our study sample. Between 60% and 99% of the study sample suggested they would not call an ambulance for box jellyfish stings, mild chest pain, paracetamol overdose or head injury leading to possible haemorrhage. Snake bites, stroke and elderly hip pain also promoted a response other than calling for emergency ambulance assistance by 14–39% of the study

sample.

While a substantial proportion of the sample did not feel an ambulance response was appropriate, many were able to recognise these cases as emergencies, suggesting they would instead transport to the ED themselves. However, there was still a substantial proportion of participants who failed to recognise case studies as emergencies, instead opting for non-emergency related responses. Most notably, 85% of participants did not recognise the head injury leading to possible haemorrhage as a potential emergency. Further, 44% of participants failed to recognise symptoms of meningitis as an emergency, 31% suggested a box jellyfish sting is not an emergency, and 35% suggested the ingestion of 5000 mg of paracetamol does not constitute an emergency level risk of overdose.

For case studies that did not constitute an emergency the 'early stages of labour' scenario and the 'elderly bruise' scenario provided the most confusion for participants. A total of 18.9% of participants suggested they would call an ambulance in response to a woman going into the early stages of labour. Interestingly, a chi-square analysis suggested men were more likely to call for an ambulance in this situation than women (30.4% vs. 16.0% respectively, p=0.001). Far more suggested this constituted an emergency with a further 37.0% suggesting they would transport directly to the hospital ED. The elderly bruise scenario also demonstrated some confusion (4.4% suggesting appropriate for ambulance assistance). Perhaps not surprisingly, those aged 61 years and more were more likely to suggest this scenario as appropriate for ambulance assistance compared to those aged 18–30 years (10.6% vs. 4.5%, respectively, p=0.038).

The elderly hip pain and severe chest pain scenarios were the only two to provide statistically significant differences across whether or not participants had in the past undertaken basic first aid training.

Discussion

The majority of participants could correctly identify low acuity conditions as not requiring ambulance assistance. Appropriate primary healthcare services would generally be utilised in these situations. The main exception to this was the 'labour' scenario (scenario #15), where 56% of respondents suggested this warranted an emergency response. This result aligns with Kirkby and Roberts' (11) findings where a high proportion of participants (48%) also misclassified this as an emergency event. Ambulance Victoria documented 630 transportations of women in the early stages of labour in 2009, supporting these research findings that emergency ambulance is utilised for uncomplicated early labour where it is not warranted (21). However, taking into consideration results from other case study scenarios, respondents typically tended to under-employ triple zero in emergency situations. Kirkby and Roberts' (11)

Table 4. Proportion of correct responses for each case study scenario for overall sample (healthcare professionals removed) and separated by those who have and have not undertaken first aid training

Case study		Emergency (yes/no) response	Incorrect response							
			Total sample		Call 000^			Recognise emergency#		
			Call 000^	Recognise	With first aid	Without first aid	p-value	With first aid	Without first aid	p-value
1	Box jellyfish	Yes	36.8% (210/544)	69.3% (377/544)	38.5% (119/309)	29.9% (26/87)	0.14	71.2%	63.2% (55/87)	0.15
2	Snake bite	Yes	61.4% (334/544)	96.3% (524/544)	63.8% (197/309)	57.5% (50/87)	0.26	95.8%	97.7%	0.41
3	Mild chest pain	Yes	29.8% (162/544)	80.1% (436/544)	28.8% (89/309)	20.7% (18/87)	0.13	79.9%	71.3% (62/87)	0.08
4	Stroke	Yes	62.7% (341/544)	89.5% 487/544)	62.5% (193/309)	42.5% (37/87)	0.16	87.7%	71.3% (62/87)	0.52
5	Severe chest pain	Yes	92.8% (505/544)	99.4% (541/544)	93.5% (289/309)	83.9% (73/87)	0.01*	99.7%	98.9%	0.34
6	Overdose	Yes	25.0% (136/544)	64.7% (352/544)	26.5% (82/309)	81.6% (16/87)	0.12	60.5%	55.2% (48/87)	0.37
7	Heap bump	Yes	1.0% (5/544)	15.4% (84/544)	0.3% (1/309)	18.4% (85/87)	0.06	16.5% (51/309)	12.6% (11/87)	0.38
8	Meningitis	Yes	6.0% (31/544)	56.4% (307/544)	4.5% (14/309)	8.0% (7/87)	0.20	53.7%	54.0% (47/87)	0.96
9	Elderly hip pain	Yes	86.0% (468/544)	92.1% (501/544)	86.4% (267/309)	74.7% (65/87)	0.01*	91.6%	86.2% (75/87)	0.13
10	Flu	No	100% (544/544)	99.4% (541/544)	100% (309/309)	100% (87/87)	NA	99.4%	98.9% (86/87)	0.63
11	Elderly bruise	No	95.8% (521/544)	95.6% (520/544)	95.8% (296/309)	90.1% (79/87)	0.07	95.8%	90.8% (79/87)	0.07
12	Lego in ear	No	100% (544/544)	63.1% (343/544)	100% (309/309)	100% (87/87)	NA	59.5%	52.9% (46/87)	0.26
13	Stubbed toe	No	98.8% (543/544)	98.9% (538/544)	100% (309/309)	100% (87/87)	NA	99.4%	97.7% (85/87)	0.17
14	Drunk	No	99.1% (539/544)	97.6% (531/544)	99.4% (307/309)	97.7% (85/87)	0.17	98.1%	95.4% (83/87)	0.16
15	Labour	No	81.1% (441/544)	44.1% (240/544)	80.6% (249/309)	72.4% (63/87)	0.10	39.2%	39.1% (34/87)	0.43
16	Back pain	No	98.8% (543/544)	98.0% (533/544)	100% (309/309)	100% (87/87)	NA	98.1%	97.7 (85/87)	0.83
17	Cut finger	No	99.6% (542/544)	90.1% (493/544)	100% (309/309)	100% (87/87)	NA	90.0%	86.2% (75/87)	0.32

^ Incorrect response for calling for emergency ambulance assistance
# Incorrect response for recognising if event is or is not an emergency
* Represents statistical significance at α<.05

research similarly found that signs and symptoms of stroke and meningitis (scenarios #4 and #8 respectively) were poorly recognised – two instances where the use of an emergency ambulance is certainly appropriate.

Our study found nearly 37% of respondents would not seek ambulance assistance for stroke and a staggering 94% for the meningitis scenario, suggesting a clear lack of awareness around the symptoms, and perhaps even severity, of meningitis. However, this number decreased to 44% of participants failing to recognise this as a potential emergency. This suggests, that while still a substantial proportion did not recognise symptoms of meningitis, 50% of participants likely did, and instead chose to transport directly to the ED rather than request ambulance assistance.

Fortunately, only 11% of participants failed to recognise the stroke scenario as an emergency, with 26% of participants suggesting they would also transport straight to the ED. These findings suggest many respondents can recognise the need for an emergency response, but rather than rely on ambulance arrival and paramedic intervention, are instead choosing to transport directly to the ED themselves. It is unclear what impact this potentially has on resource allocation of ambulance services and EDs, and is outside the scope of the present study to determine which action may be more or less appropriate for each case study scenario. Nonetheless, these findings permit careful consideration regarding the ideal pathways the healthcare system would prefer patients to take in emergency situations and warrants further study.

Also of interest was our comparison between those having previously undertaken first aid training versus those who had not. Statistically significant differences were only noted for the severe chest pain (#5) and elderly hip pain scenarios (#9), and only for the decision to call for ambulance assistance (not ability to recognise these as potential emergencies). However, other confounding factors may well be at play here. For example, the elderly were more likely to call for ambulance assistance, and also had lower proportions having previously undertaken first aid training compared to other age-groups. Kirkby and Roberts (11) also found basic first aid training may have some moderating effect and concluded this relationship should be investigated further. However, previous research also notes high proportions of calls from the elderly for falls, with approximately a quarter not requiring transport to hospital (22).

It should be noted that it is possible different individuals interpreted our case study scenarios in different ways, and that participants may have different understandings of information that was presented (eg. 'early stages of labour'). The case studies utilised in this research focussed on clinical information pertaining to the primary health concern, but did not consider other potentially relevant aspects such as comorbidities or social issues. Research suggests it is sometimes necessary to transport patients to hospital for non-clinical reasons (23).

Future research could employ the use of graphic/pictorial aids or video vignettes to provide further information to individuals, allowing for a more considered decision. It is also possible that our recruitment method (ie. personal contacts and snowball sampling) may have introduced some bias. For example, while we had relatively equal distributions across educational categories, the sample was weighted toward females. This is not surprising given there is clear evidence women are more likely to participate in scientific studies than men (24-26). These factors could suggest our sample may not be entirely reflective of the greater Australian population. However, our data suggests no differences in decisions to call an ambulance were found between males and females – and previous research suggests ones gender is not predictive of calling an ambulance inappropriately (11) – thus suggesting these demographical variances across our sample may have impacted little on study results. There was also a high proportion of participants from our sample that had previously undertaken some form of basic first aid training. It is difficult to gauge the rates of basic first aid training provision to the greater population. A telephone survey of 803 Western Australian residents in 2006 suggested 30% of their sample had previously undertaken basic first aid training (27). Our results suggested that those having undertaken some form of basic first aid training could more accurately judge whether case studies were reflective of a medical emergency. Given our sample was weighted toward those trained in basic first aid, this may suggest recognition of medical emergencies may actually be poorer than our data suggests. Future research utilising an entirely representative sample of the Australian population would be invaluable in exploring this further.

Lastly, it is difficult to establish the extent to which statistically significant differences noted in this study translate to clinically significant outcomes. This was outside the scope of the present study. Future research could work to establish the impact on health outcomes – as well as ambulance and ED resources – a lack of understanding around appropriateness of when to utilise an emergency ambulance for certain medical conditions would cause.

These limitations notwithstanding, our data suggests an underutilisation of ambulance services for the majority of our scenarios for which an ambulance request is appropriate. Further, there was also confusion around whether or not many of our 'emergency' scenarios actually constituted an emergency. To a certain extent, these results conflict with the previous investigation undertaken by Kirkby and Roberts (11) in the UK that found far more instances of over-utilisation of ambulance resources for low acuity conditions. These differences are potentially explained by the different settings in which the research was undertaken (ie. UK vs. Australia). Our results are surprising given the ongoing discussion around increasing overutilisation of ambulance resources for low acuity conditions (8,28-29). Some suggest the problem may lie more with 'frequent flyers' who repeatedly and knowingly abuse ambulance resources for low acuity conditions (21,22).

Regardless, our results advocate for educational strategies that seek to improve knowledge and awareness of when it is appropriate to place a call for emergency ambulance assistance. One potential avenue is further national awareness campaigns targeting specific conditions. A 2013 study found an increase in calls for ambulance for stroke after national public awareness campaigns (10). It was outside the scope of that study to interpret whether these calls were for patients actually suffering a stroke, yet our results suggest a relatively good recognition of stroke symptoms as an emergency (ie. only 11% that did not). Unfortunately, this limitation seems consistent across other studies evaluating public education campaigns around ambulance calls. A study evaluating the National Heart Foundation comprehensive public awareness campaign noted increased calls for ambulance assistance in campaign months compared to non-campaign months (32), but were unable to provide comment on the appropriateness of these calls.

A number of other education campaigns across Australian states have also been trialled (New South Wales, Victoria, Queensland). Future research investigating not only changes in ambulance requests in response to these campaigns, but that also investigates the appropriateness of these calls, would be highly desirable. Furthermore, future research should continue to work on isolating specific life-threatening conditions for which recognition of symptoms, or knowledge of the severity of the condition, is poor. Working to confirm the extent of ambulance misuse, and factors that lead to misunderstanding among offenders, would be beneficial.

Conclusion

It is clear that an ongoing problem exists (both within Australia and internationally) around the inappropriate use of emergency ambulances, and that this places undue burden on emergency services with the potential to negatively impact on patient outcomes. Based on participant responses to a series of case studies, this study demonstrated a lack of recognition around the severity of certain emergencies, but participants perceived choices failed to demonstrate substantial inappropriate ambulance usage. While more research may need to be undertaken to better gauge the extent these gaps may impact on clinical outcomes, the results of this research suggest that the typical lay person could likely benefit from further education clarifying what medical circumstances truly classify as a medical emergency.

Conflict of interest

The authors declare they have no competing interests. Each author of this paper has completed the ICMJE conflict of interest statement.

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